

EQUATORIAL THERMOSPHERIC MEASUREMENTS OF TEMPERATURES AND WINDS AT AREQUIPA, PERU

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Arequipa FPI observatory: Facts

Field-widened 10 cm FPI Automatic operations. Located at Arequipa, Peru (16.5 S, 71.5 W) (at the NASA lidar satellite tracking station) 4.5 degrees south of magnetic equator FPI observed winds overhead of Jicamarca radar. Observing directions typically Z, N, S, W or N, S, E, W. Data selected from observations between new moon, April 1983, and new moon, August, 1983; 55 nights reduced. Some results from 1984 but not all reduced. Error bars typically 15-20 m/s for winds, 50 to 75 degrees for temperature.

Equatorial kinetic temperature: Results

Enhancement of FPI temperatures above quiet levels a few hours after the start of magnetic activity. Magnitude of this enhancement about 300 degrees. This is followed by relaxation to pre-storm levels. Apparent average offset of RPI temperatures from MSIS by 100-200 degrees for relatively quiet times. Definite suggestion of a midnight thermal enhancement for April and August data. Magnitude about 100 degrees. Seen in both 1983 and 1984 observations.

Conclusions

6300A surface brightnesses: Results

Definite enhancement of 6300A surface brightness in the south as compared with other directions. Probably connected to the tropical airglow arcs. Meridional winds small (< 25 m/s) throughout night. Indication of northward migration of the observed 6300A enhancement in the evening hours as observations approach local winter solstice. This is probably related to the observed poleward (to the south) meridional wind (of magnitude 50 m/s) in this period.

Equatorial thermospheric winds: Results

Zonal component of winds always eastward, but speed approaches zero sooner near equinox than at summer solstice. Typical magnitude at peak is of order 100 to 150 m/s. Suggestion of zonal wind increase after twilight and recovery of 6300A emission for April data. Origin not clear

but may be related to midnight thermal enhancement. Meridional wind virtually zero for equinox in 1983; shows evening flow towards winter hemisphere in early evening for solstice data. Suggestion of post-midnight surge in April 1984 data. No major effects associated with mag. storm activity. Suggestion of decrease in zonal component below nominal levels.

HERNANDEZ: MID-LATITUDE THERMOSPHERIC NEUTRAL TEMPERATURES

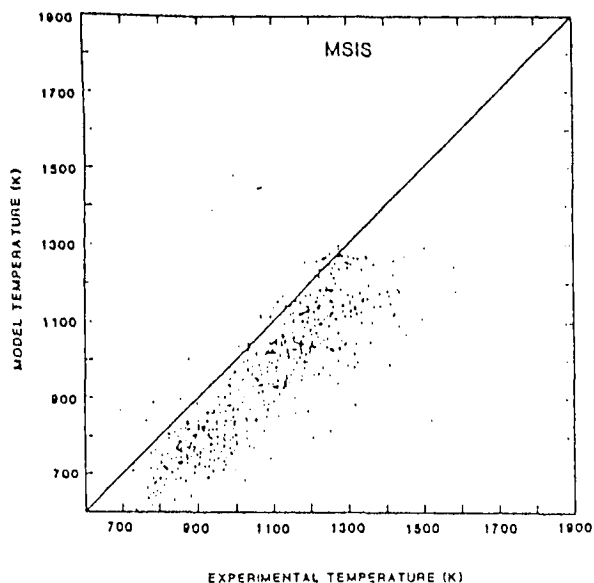


Fig. 3. Comparison of the experimental temperatures with the MSIS empirical model (*Hedin et al.*, 1977).

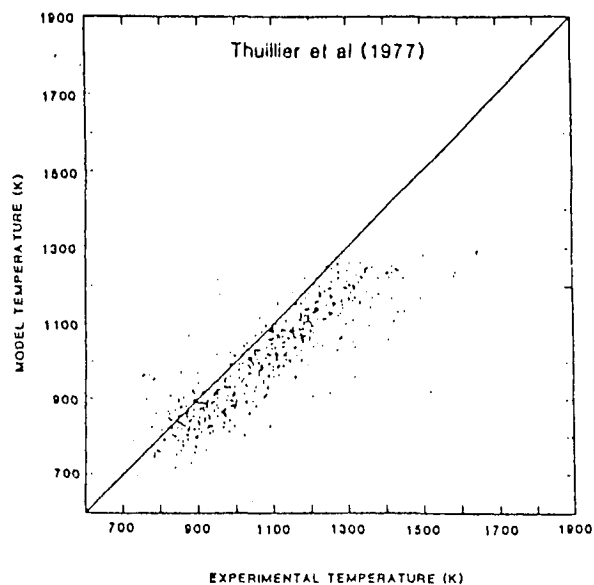


Fig. 4. Comparison of the experimental temperature with the empirical model of *Thuillier et al.* (1977a, b).

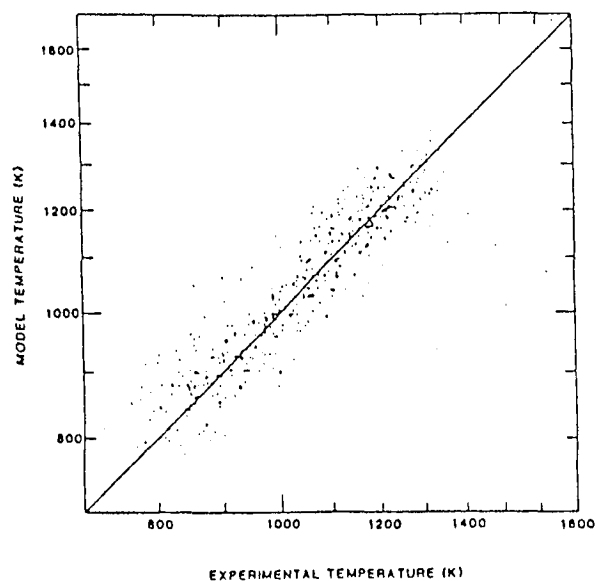


Fig. 11. Fit of the experimental data to four parameters: solar radio flux, geomagnetic activity, annual variation of the solar declination and a semi-annual variation. The correlation coefficient is 0.91.

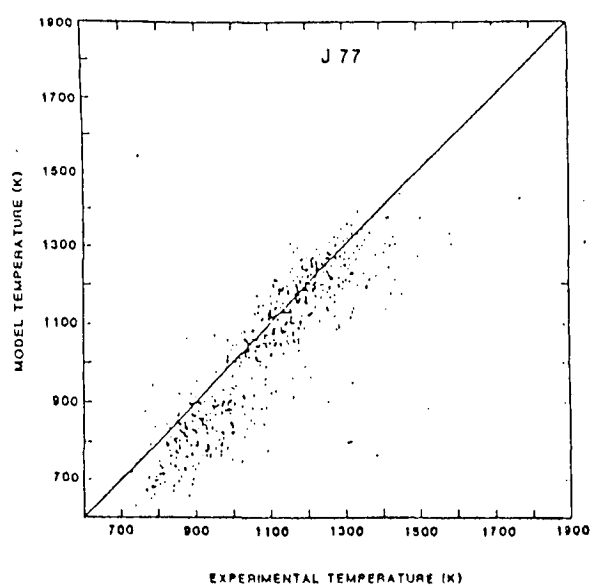
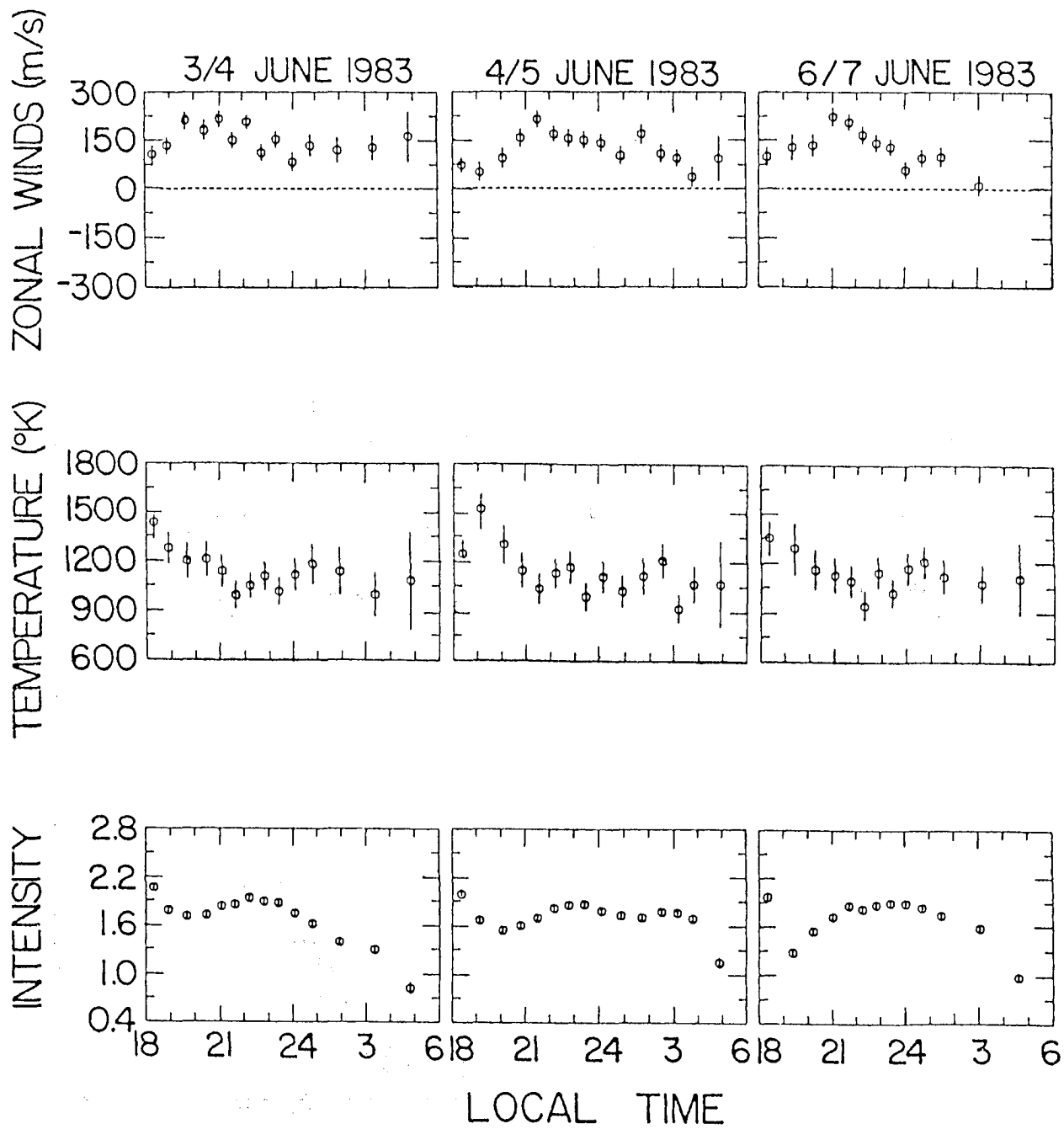
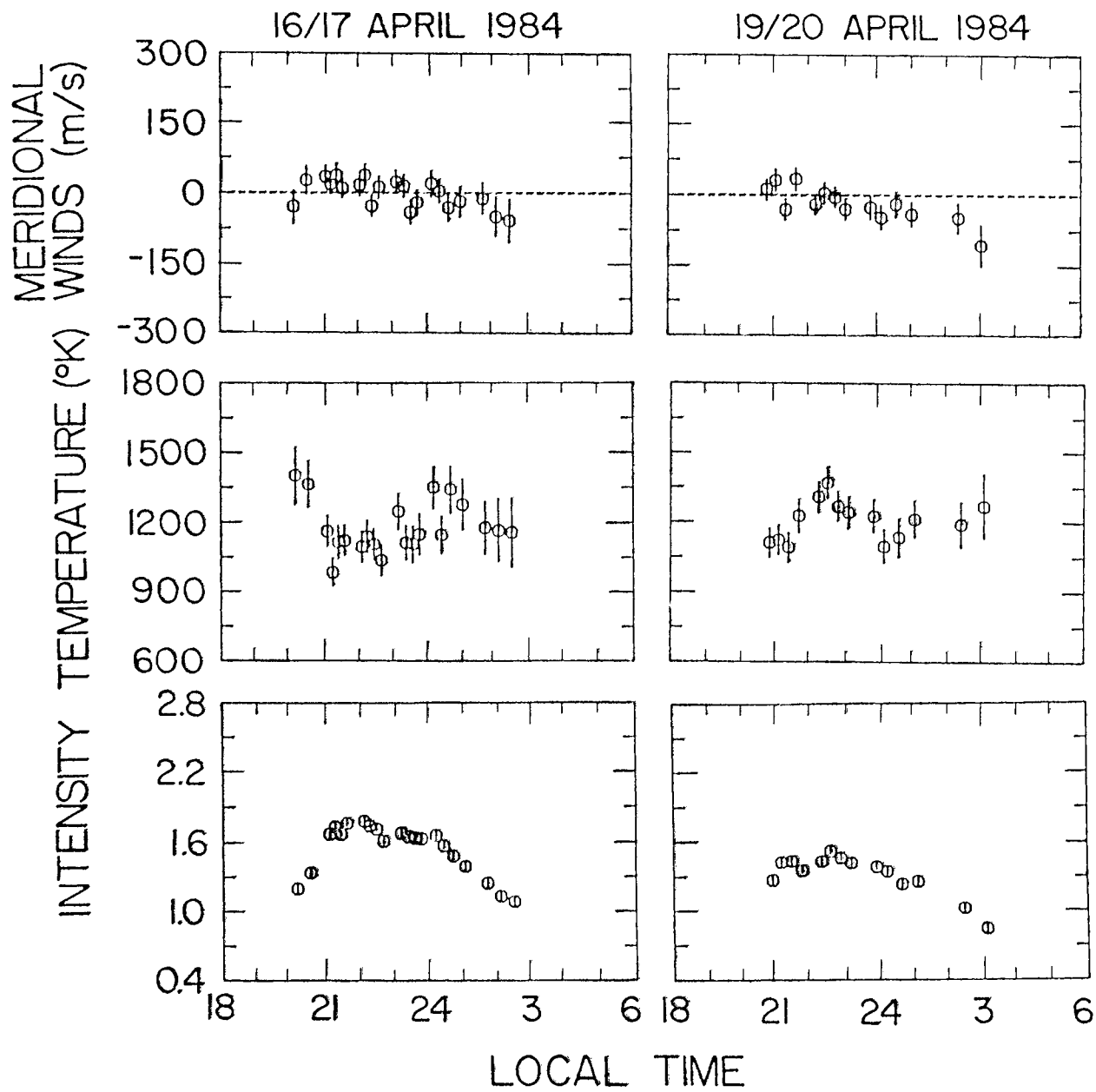
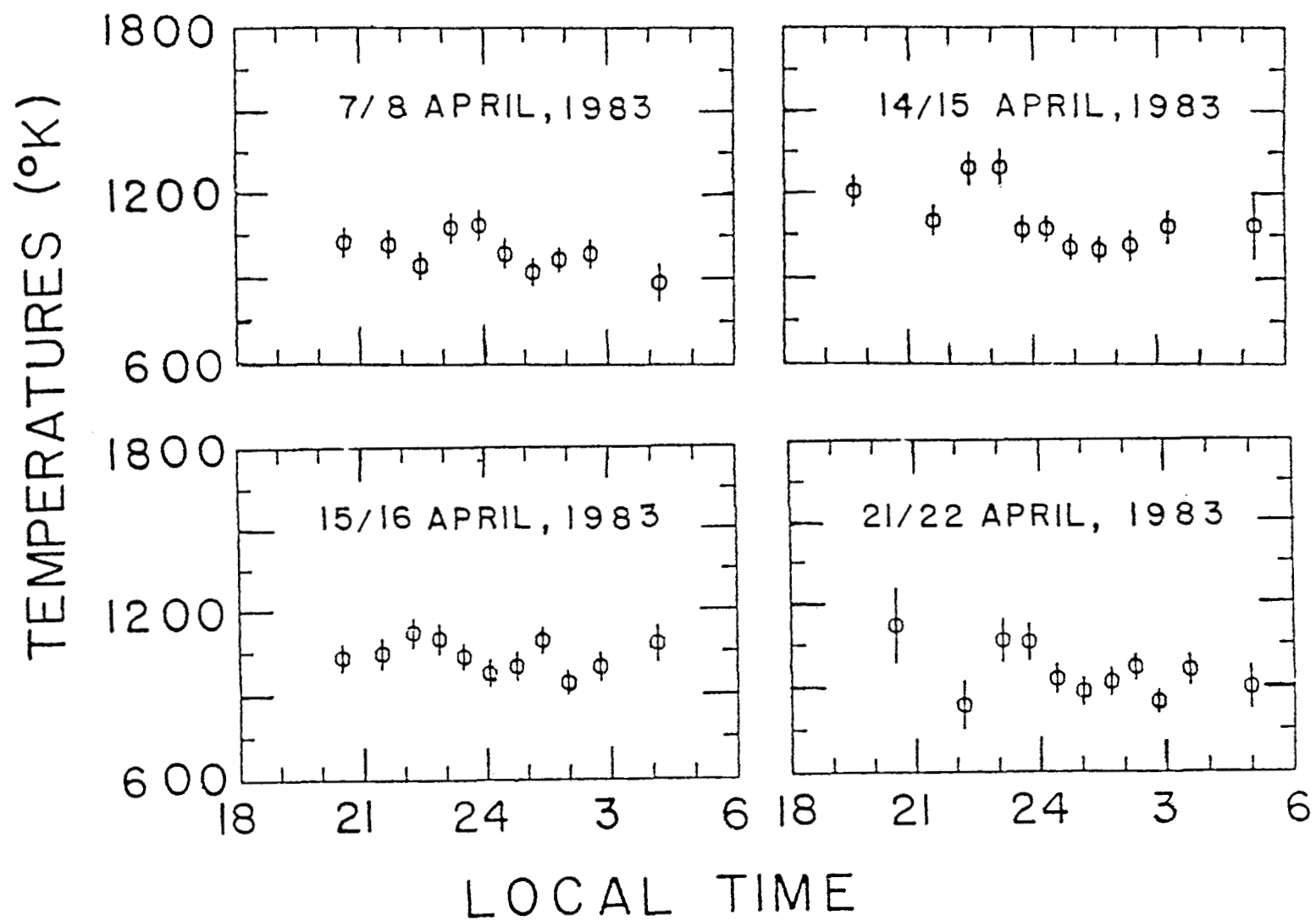
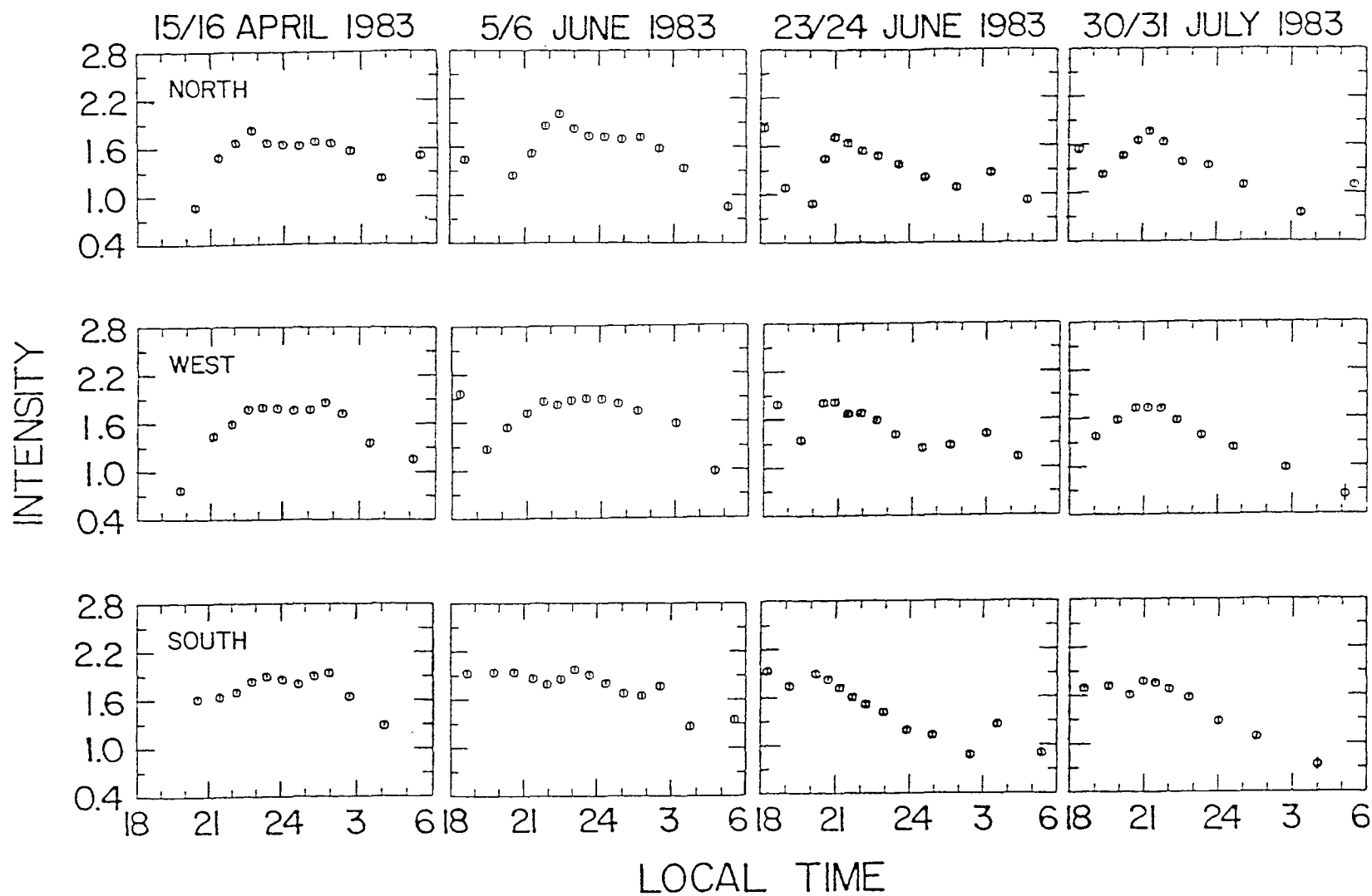


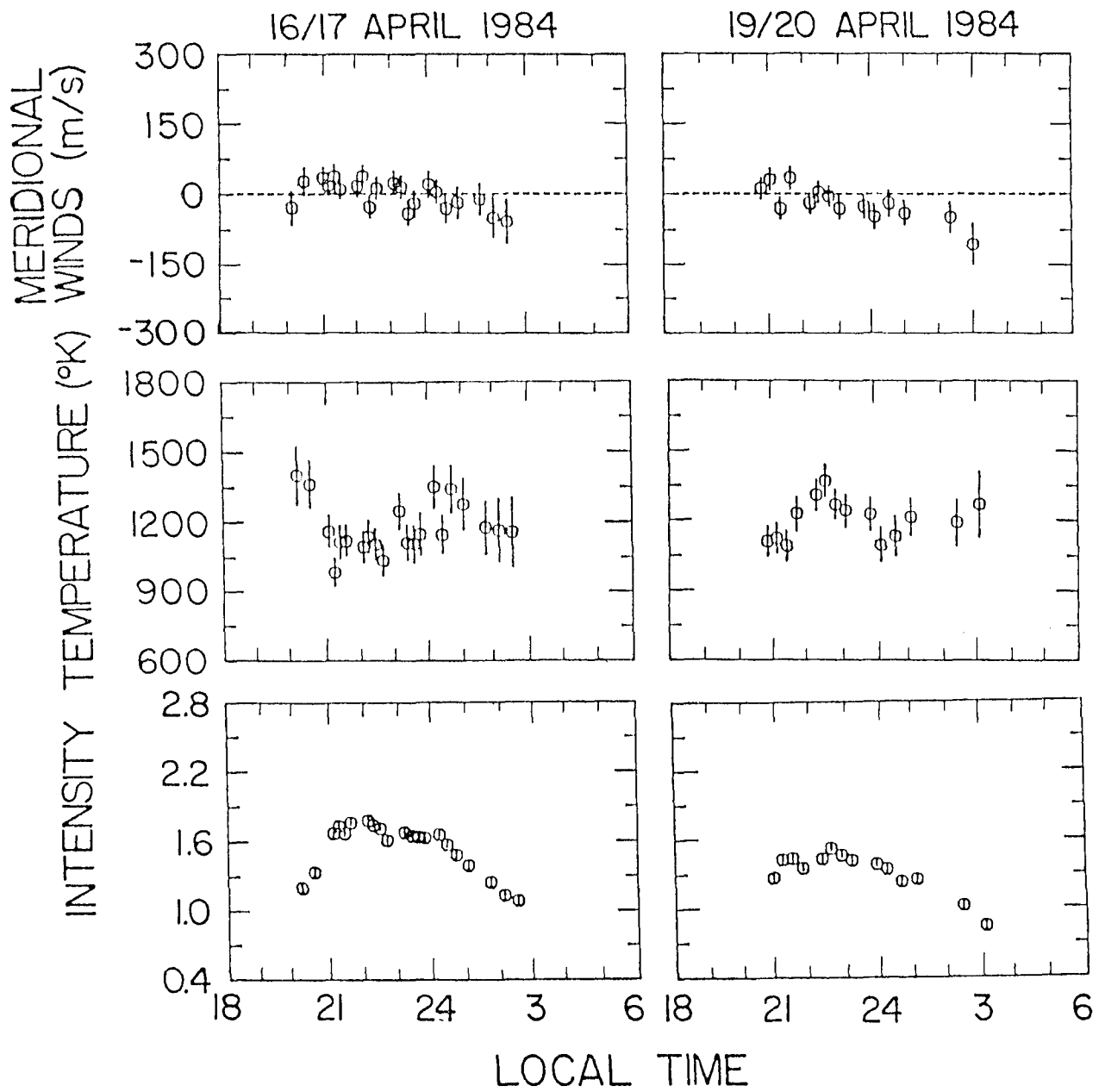
Fig. 5. Comparison of the experimental temperatures with the empirical model of *Jacchia* (1977).

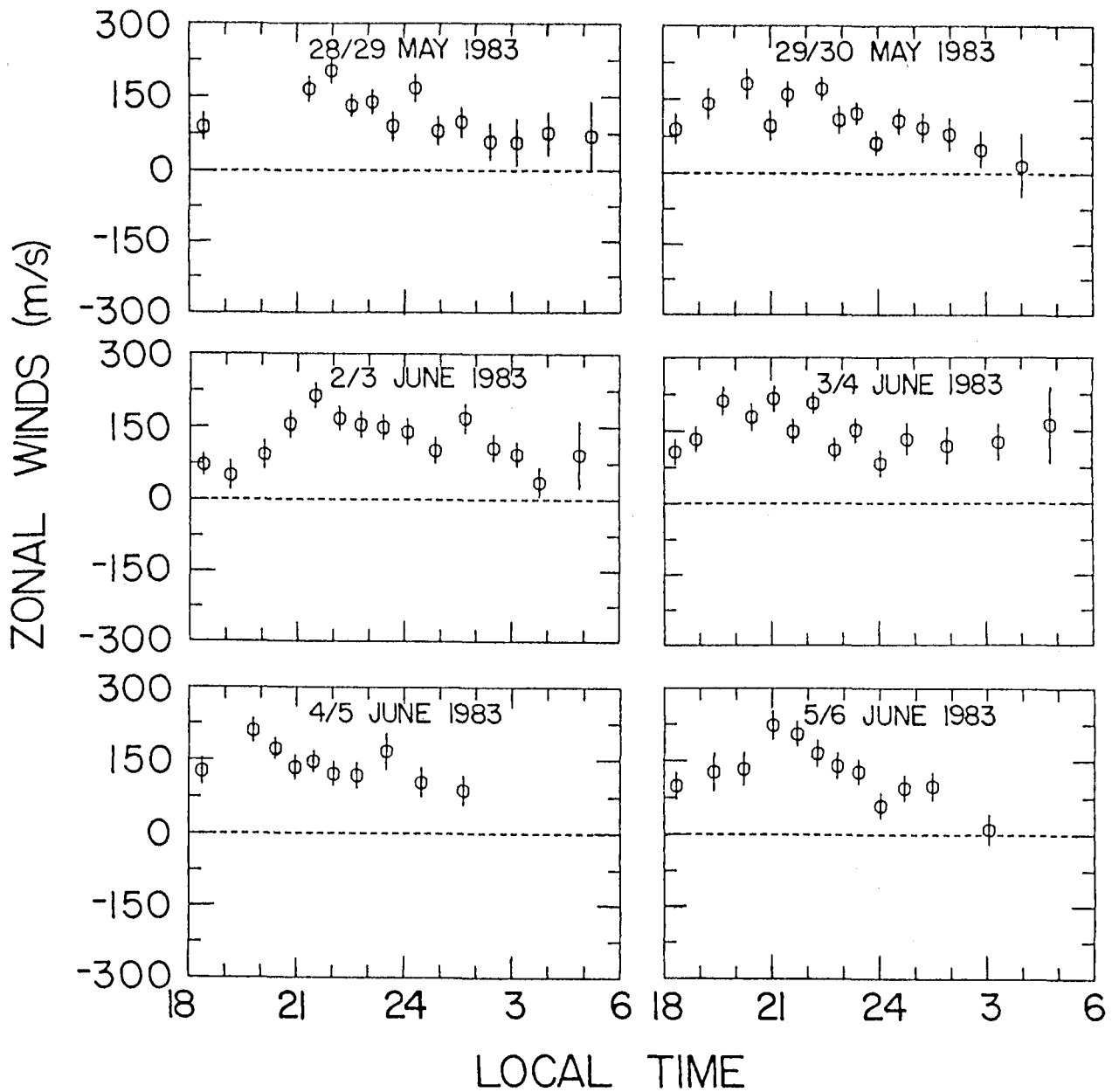


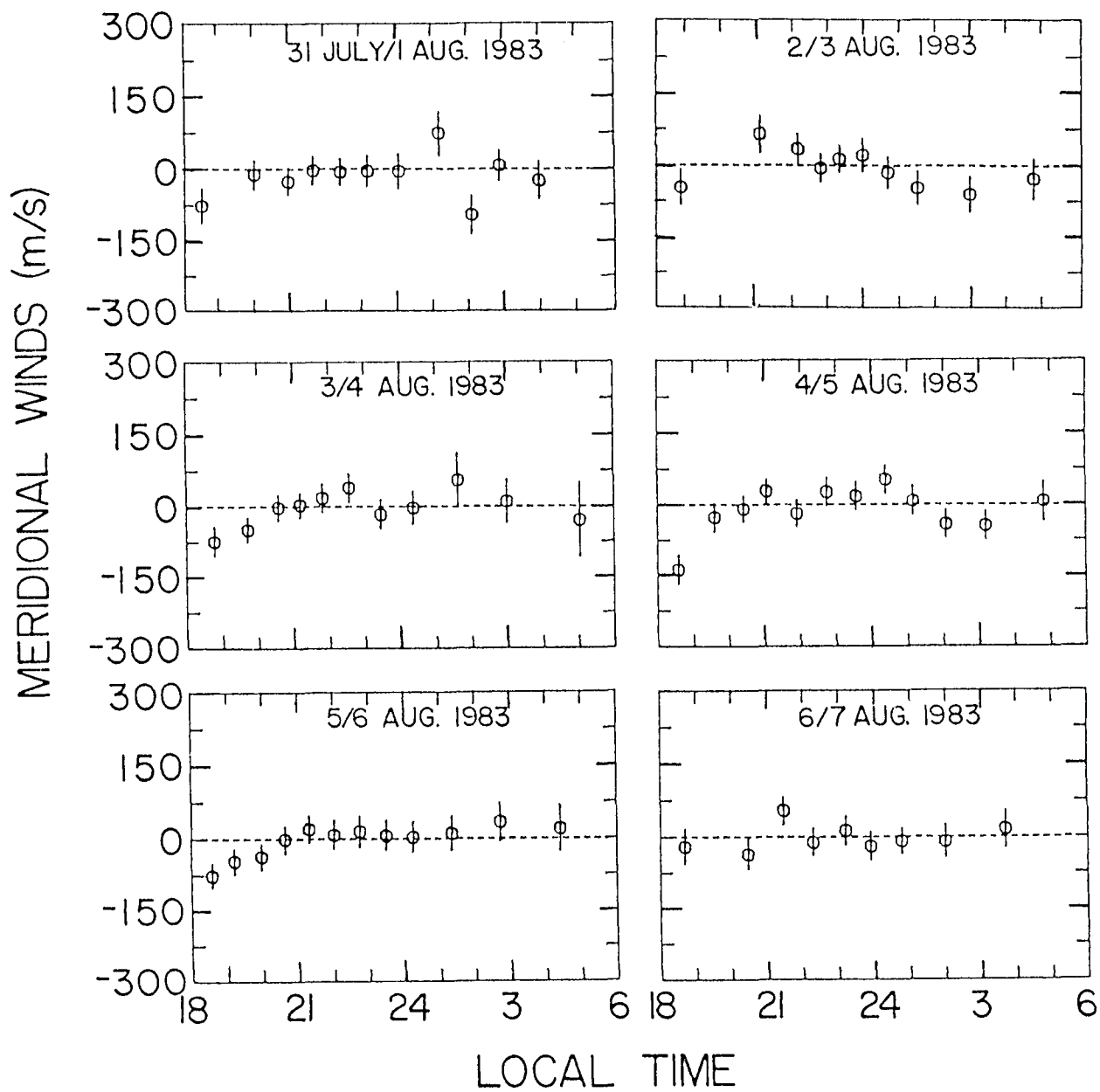


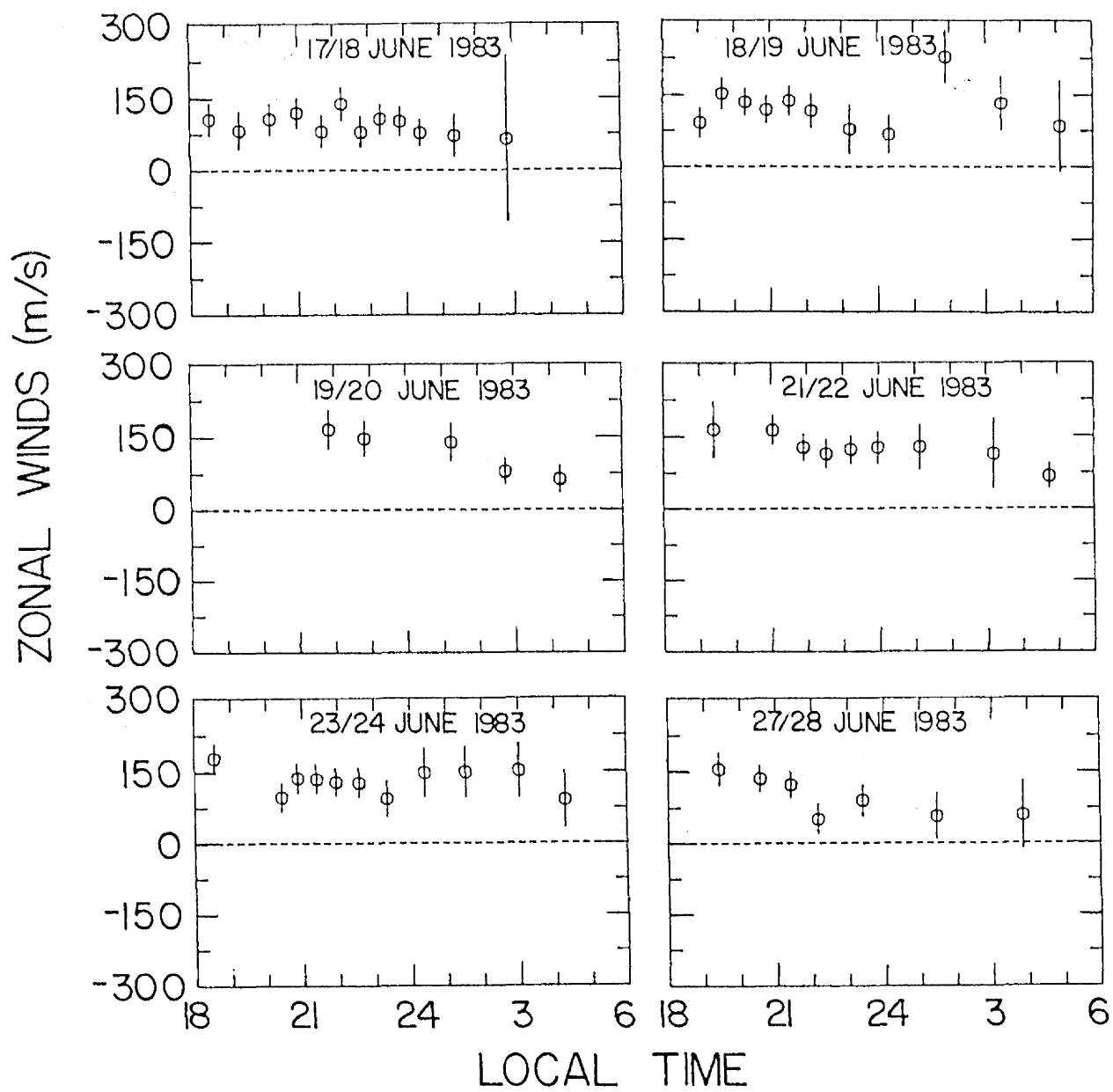


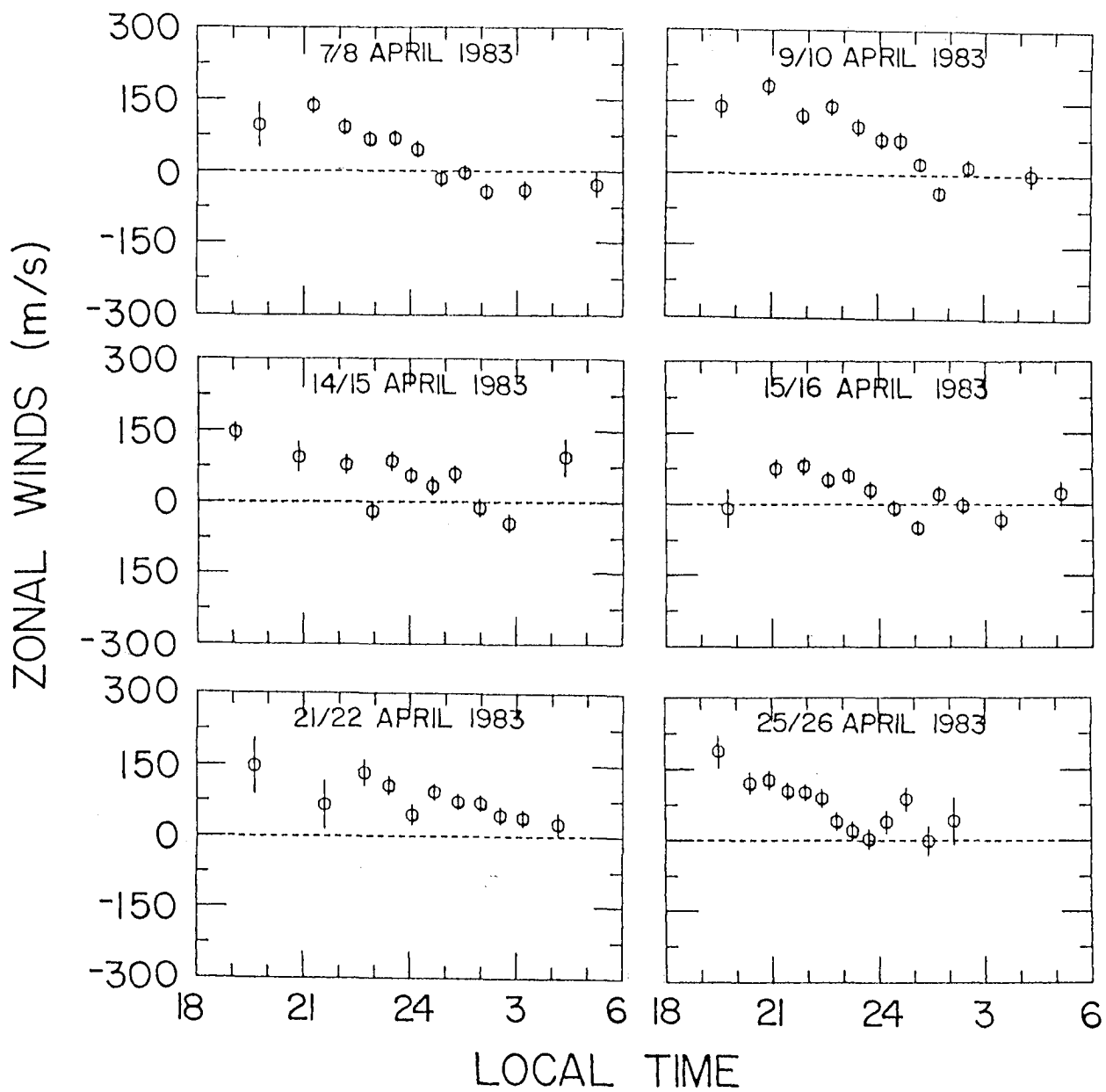


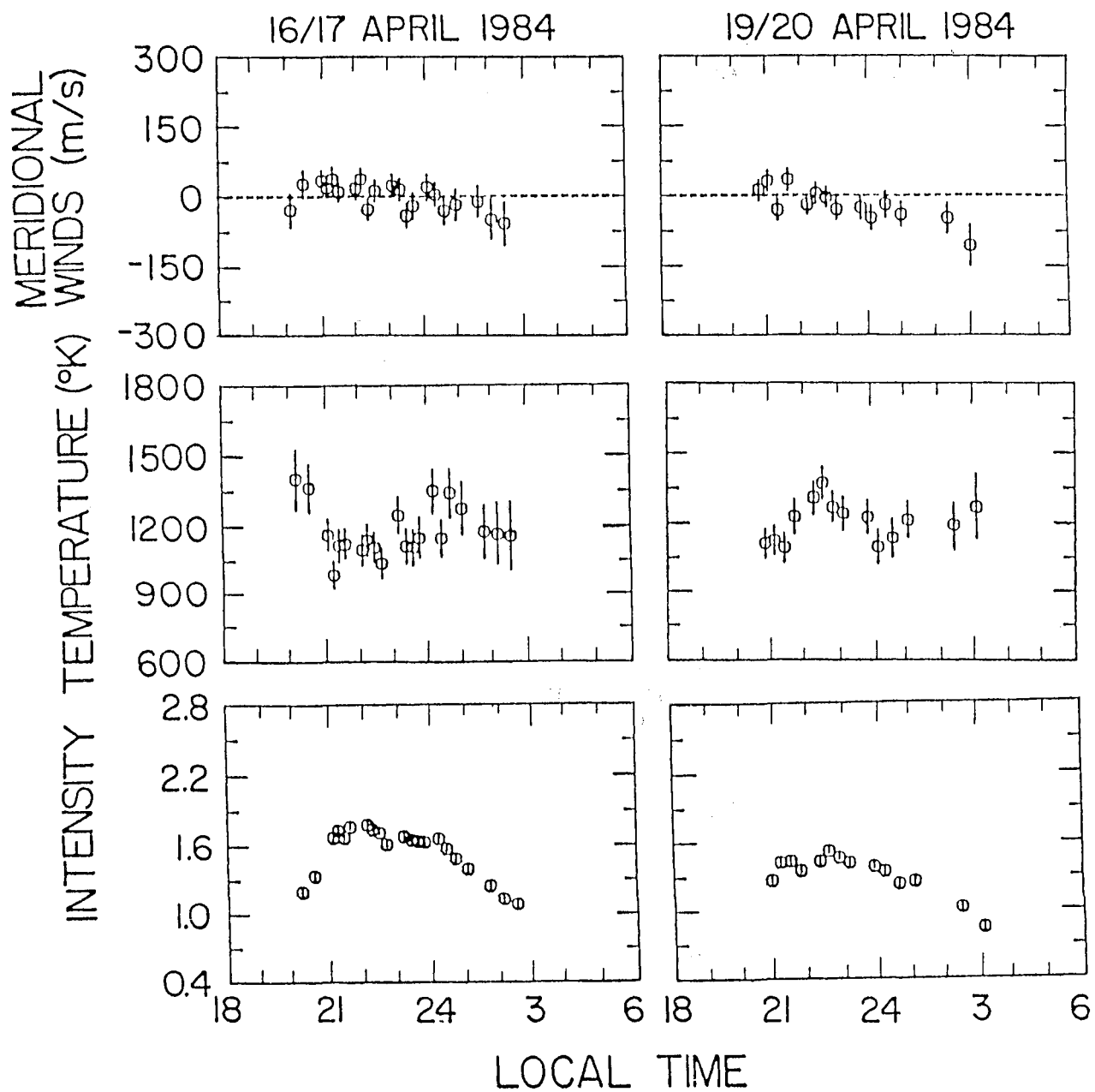


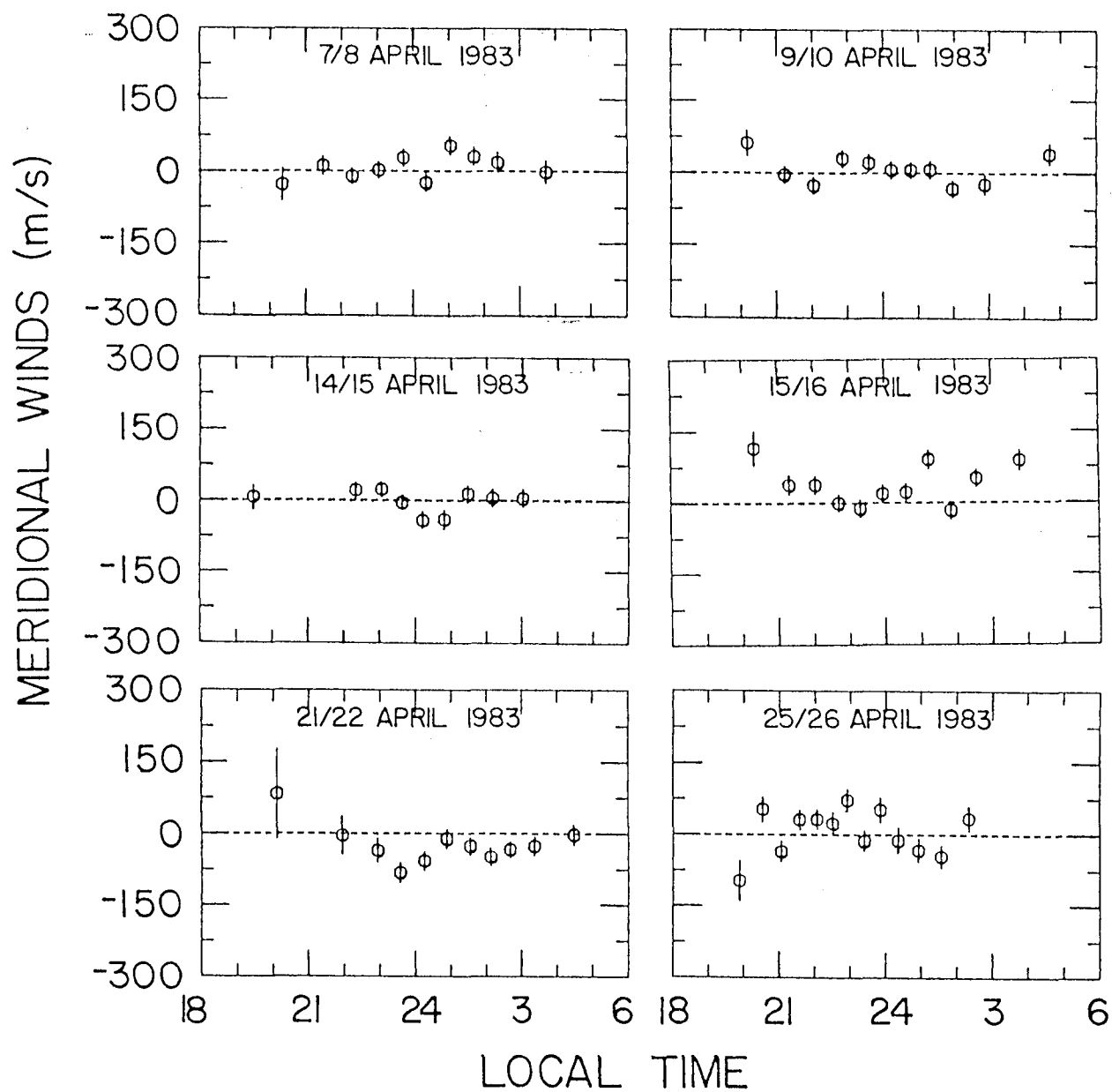


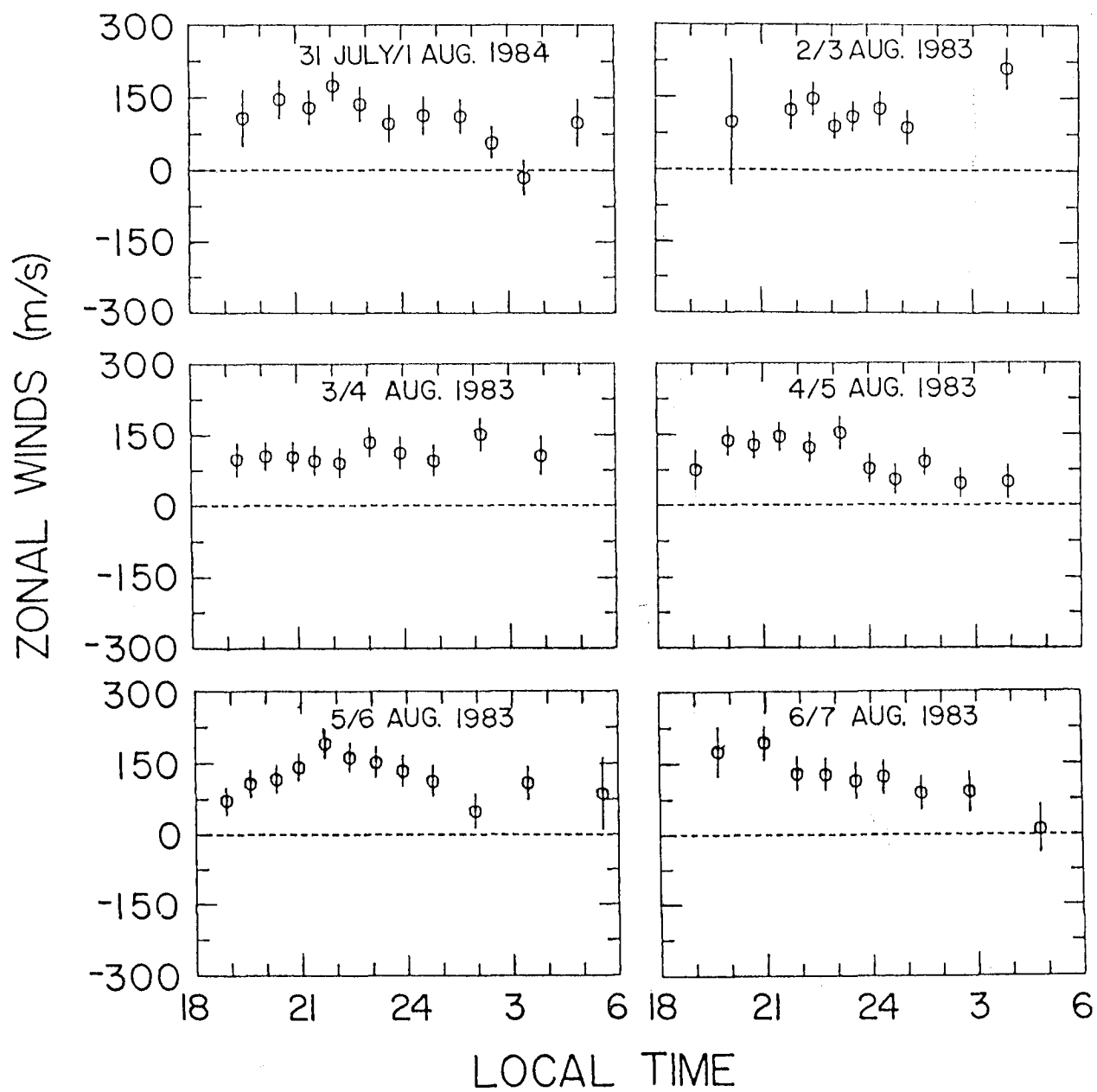


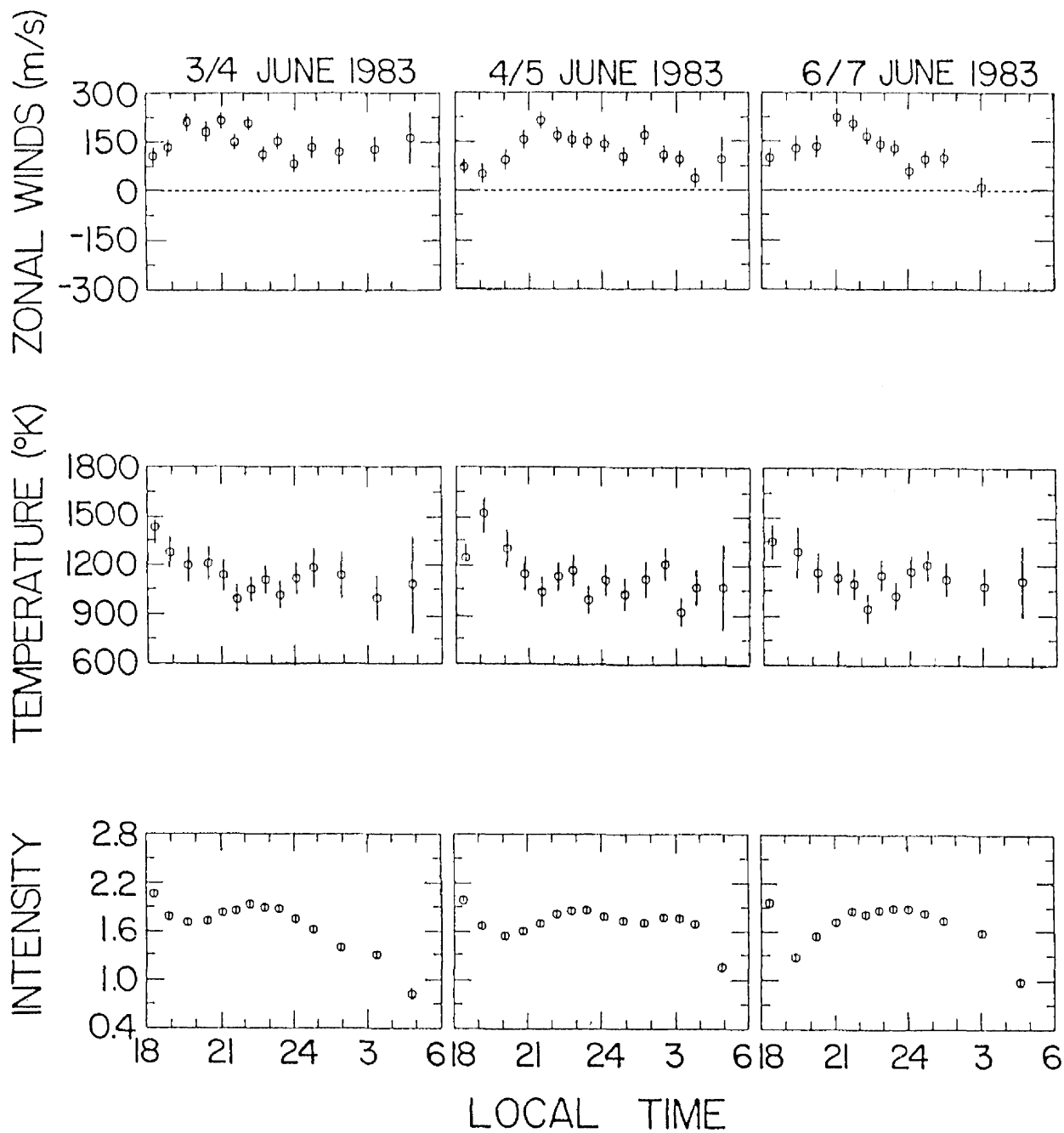


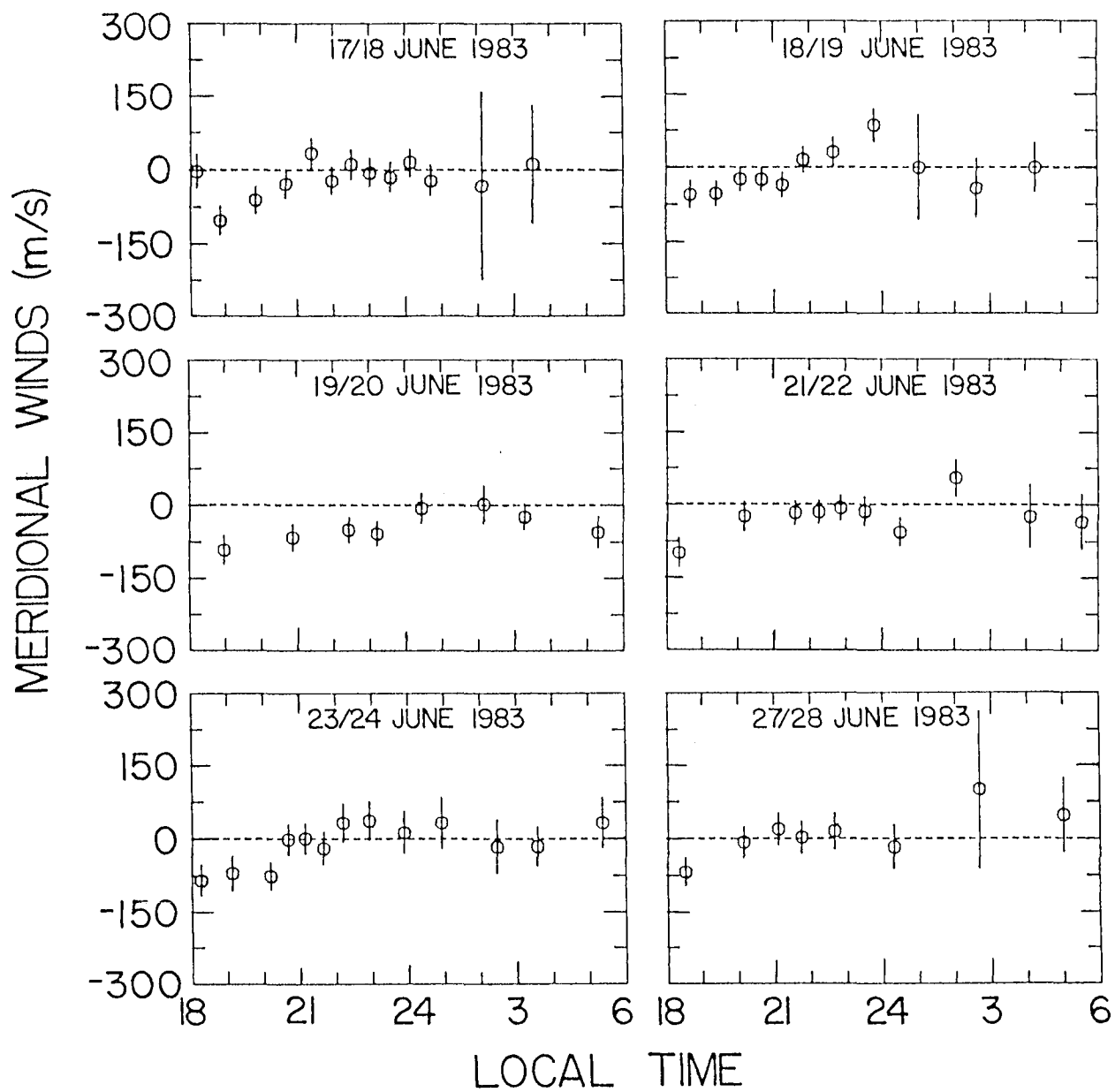


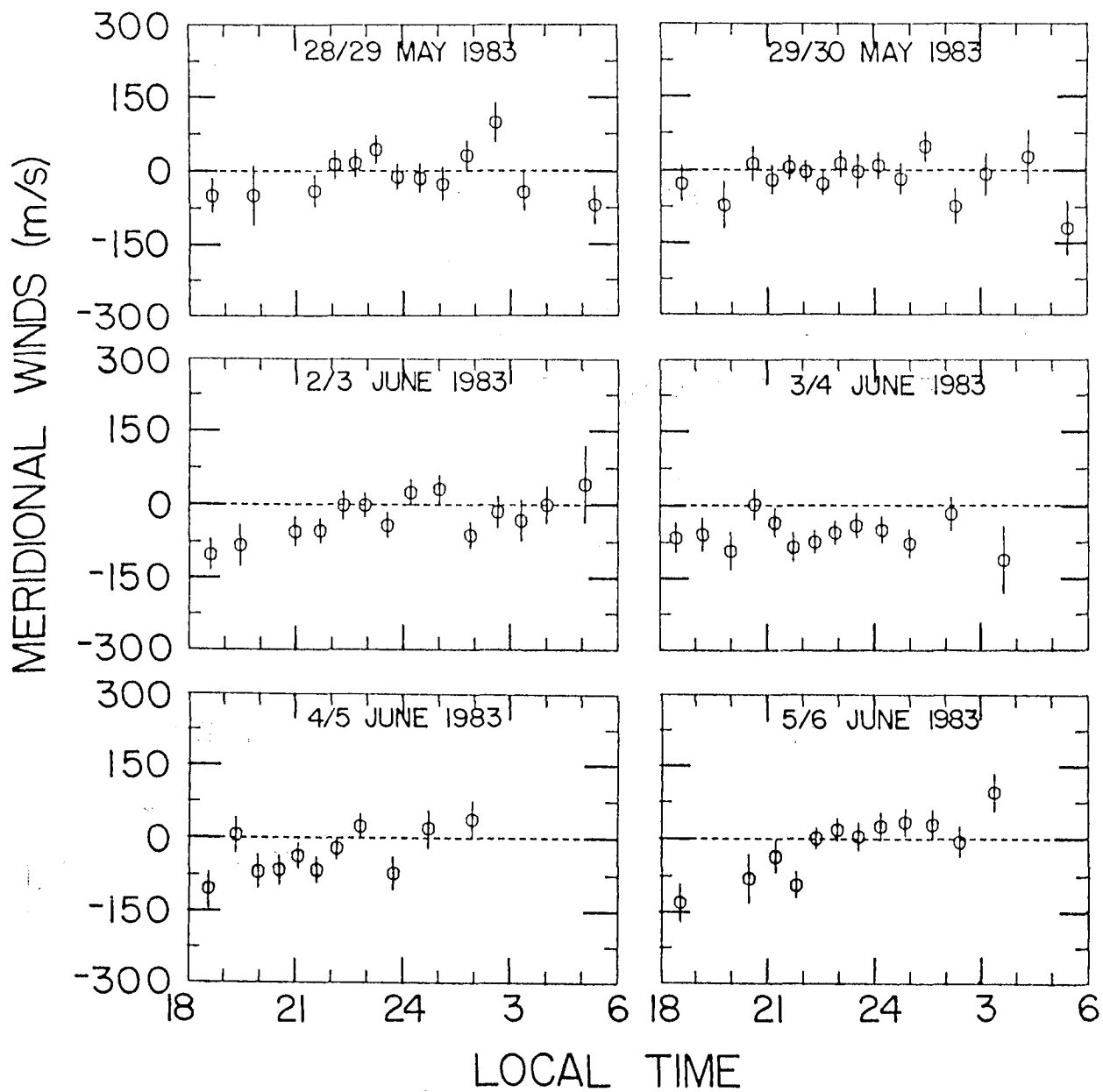












Horizontal wind, temperature, and intensity observations
 DAY 271, 1984
 Arequipa, Peru

